

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method for ~~dynamically controlling~~dynamic control of a multiple actuator-sensor smart matter dynamic control system, comprising:
 - predicting future behavior of the multiple actuator-sensor smart matter dynamic control system using a plurality of control system models;
 - determining at least one control system model which is more successful than at least one other model of the plurality of models in predicting the future behavior of the multiple actuator-sensor smart matter dynamic control system;
 - increasing a weight of the at least one ~~more successful~~more successful control system model in the plurality of control system models used to predict future behavior of the multiple actuator-sensor smart matter dynamic control system relative to a weight of the at least one other model; and
 - using the at least one ~~more successful~~more successful control system model with the increased weight to control the multiple actuator-sensor smart matter dynamic control system.

2. (Original) The method of claim 1, wherein the plurality of control system models comprises N control system models and each of the N control system models is initially assigned a weight w_i such that

$$\sum_{i=1}^N w_i = 1.$$

3. (Previously Presented) The method of claim 2, wherein using a plurality of control system models includes defining an investing fraction a_i of a weight w_i of an i^{th} model, where $0 < a_i < 1$.

4. (Previously Presented) The method of claim 3, wherein each model is used to predict, at a current time t , a future state of the multiple actuator-sensor smart matter dynamic control system at a later time $(t+\Delta t)$:

$$x_i(t + \Delta t; x(t), u(t)),$$

where $x(t)$ is a state of the multiple actuator-sensor smart matter dynamic control system at time t , $x_i(t+\Delta t)$ is a state of the multiple actuator-sensor smart matter dynamic control system at time $t+\Delta t$ estimated by the i^{th} model, and $u(t)$ is a control input at time t .

5. (Previously Presented) The method of claim 4, further comprising assigning a new weight W_i^{new} for the i^{th} model according to the formula

$$w_i^{\text{new}} = (1 - a_i)w_i^{\text{old}} + a_i \left[\frac{1/(e_i^2 + \sigma^2)}{\sum_{j=1}^N 1/(e_j^2 + \sigma^2)} \right],$$

wherein w_i^{old} is a previous weight for the i^{th} model, e_i is a prediction error of the i^{th} model, and σ^2 is a noise variance of the multiple actuator-sensor smart matter dynamic control system.

6. (Previously Presented) The method of claim 1, further including repeating the predicting, determining and increasing steps within one or more selectable time periods.

7. (Previously Presented) The method of claim 1, further including summing prediction error over a finite interval.

8. (Previously Presented) The method of claim 1, further comprising adding new models.

9. (Currently Amended) A ~~dynamical~~dynamic controller of a multiple actuator-sensor smart matter ~~dynamical~~dynamic control system, comprising:

means for predicting a future behavior of a multiple actuator-sensor smart matter ~~dynamical~~dynamic control system using a plurality of control system models;

means for determining at least one control system model which is more successful than other models in the plurality of models in predicting future behavior of the multiple actuator-sensor smart matter ~~dynamical~~dynamic control system;

means for increasing a weight of the at least one more successful control system model in the plurality of control system models used to predict future behavior of the multiple actuator-sensor smart matter ~~dynamical~~dynamic control system; and

means for using the at least one more successful control system model to control the multiple actuator-sensor smart matter ~~dynamical~~dynamic control system.

10. (Previously Presented) The controller of claim 9, wherein the plurality of control system models comprises N control system models, and each of the N control system models is initially assigned a weight w_i such that

$$\sum_{i=1}^N w_i = 1.$$

11. (Previously Presented) The controller of claim 9, wherein the means for predicting a further behavior defines an investing fraction a_i of a weight w_i of an i^{th} model, where $0 < a_i < 1$.

12. (Currently Amended) The controller of claim 11, wherein each model is used to predict, at a current time t , a future state of the multiple actuator-sensor smart matter ~~dynamical~~dynamic control system at a later time $(t + \Delta t)$:

$$x_i(t + \Delta t; x(t), u(t)),$$

where $x(t)$ is a state of the multiple actuator-sensor smart matter dynamic control system at time t , $x_i(t+\Delta t)$ is a state of the multiple actuator-sensor smart matter dynamic control system at time $t+\Delta t$ estimated by the i^{th} model, and $u(t)$ is a control input at time t .

13. (Previously Presented) The controller of claim 11, wherein the means for increasing a weight assigns a new weight w_i^{new} for the i^{th} model according to the formula

$$w_i^{\text{new}} = (1-a_i)w_i^{\text{old}} + a_i \left[\frac{1/(e_i^2 + \sigma^2)}{\sum_{j=1}^N 1/(e_j^2 + \sigma^2)} \right],$$

wherein w_i^{old} is a previous weight for the i^{th} model, e_i is a prediction error of the i^{th} model, and σ^2 is a noise variance of the multiple actuator-sensor smart matter dynamic control system.

14. (Currently Amended) A ~~dynamic~~dynamic controller of a multiple actuator-sensor smart matter ~~dynamic~~dynamic control system, comprising:

a prediction circuit usable to predict a future behavior of the multiple actuator-sensor smart matter ~~dynamic~~dynamic control system using a plurality of control system models;

a success determination circuit usable to determine at least one control system model which is more successful than at least one other model in the plurality of models in predicting the future behavior of the multiple actuator-sensor smart matter ~~dynamic~~dynamic control system;

a weight increasing circuit usable to increase a weight of the at least one ~~more-successful~~more-successful control system model relative to the at least one other model; and

a controller that uses ~~at least the at least one more-successful~~more-successful control system ~~models-model~~ to control the multiple actuator-sensor smart matter ~~dynamic~~dynamic control system.

15. (Previously Presented) The controller of claim 14, wherein the plurality of control system models comprises N control system models, and each of the N control system models is initially assigned a weight w_i such that

$$\sum_{i=1}^N w_i = 1.$$

16. (Previously Presented) The controller of claim 14, wherein the prediction circuit defines an investing fraction a_i of a weight w_i of an i^{th} model, where $0 < a_i < 1$.

17. (Currently Amended) The controller of claim 14, wherein each model is used to predict, at a current time t , a future state of the multiple actuator-sensor smart matter ~~dynamic~~dynamic control system at a later time $(t+\Delta t)$:

$$x_i(t + \Delta t; x(t), u(t)),$$

where $x(t)$ is a state of the multiple actuator-sensor smart matter dynamic control system at time t , $x_i(t+\Delta t)$ is a state of the multiple actuator-sensor smart matter dynamic control system at time $t+\Delta t$ estimated by the i^{th} model, and $u(t)$ is a control input at time t .

18. (Previously Presented) The controller of claim 16, wherein the weight increasing circuit assigns a new weight w_i^{new} for the i^{th} model according to the formula

$$w_i^{\text{new}} = (1-a_i) w_i^{\text{old}} + a_i \left[\frac{1/(e_i^2 + \sigma^2)}{\sum_{j=1}^N 1/(e_j^2 + \sigma^2)} \right],$$

wherein w_i^{old} is a previous weight for the i^{th} model, e_i is a prediction error of the i^{th} model, and σ^2 is a noise variance of the multiple actuator-sensor smart matter dynamic control system.